



Tennessee Division of Underground Storage Tanks

Underground Storage Tank Compliance Training

Version 1.6
September 20, 2006

Tennessee Department of Environment and Conservation

Why Compliance Training?

- 👉 **Response to Tank Owner Requests**
- 👉 **To Help Tank Owners Understand Compliance**
- 👉 **To Reduce the Number of Most Frequently Found Violations**

Do you know what are the most frequently found violations?

Most Frequent Violations

- 1 Failure to Have Leak Detection Records**
- 2 Failure to Test Automatic Line Leak Detectors**
- 3 Failure to Do Annual Line Tightness Test**
- 4 Failure to Test Cathodic Protection**
- 5 Failure to Report a Suspected Release**

These violations can be very costly to you...

Some Typical Civil Penalties

Violation	Civil Penalty
Failure to have leak detection records	\$200 / month / tank
Failure to tightness test pressurized piping	\$1,500 / line
Failure to test automatic line leak detector	\$750 / line
Failure to test cathodic protection	\$1000
Failure to report a suspected release	\$2,500
Failure to do release detection	\$1,500 / tank
Failure to have spill prevention	\$1,500 / tank
Failure to have overfill protection	\$1,500 / tank
Operating a substandard UST system	\$2,500/ system
Illegal delivery of petroleum	\$1,000 / delivery

A few words about Illegal deliveries...

- Occurs when Current certificate not issued /posted
- Violation for the tank owner AND delivery company
- Web listing to inform delivery companies
<http://www.tennessee.gov/environment/ust/WOcCertificates.shtml>

“It is unlawful for any person to place or cause to be placed petroleum substances in a petroleum underground storage tank without a certificate required pursuant to subdivision (c)(1). The commissioner may... give notice on the department web site for any tank that does not have a current certificate”. --- TCA 68-215-109(c)

4 Things You Must Know:

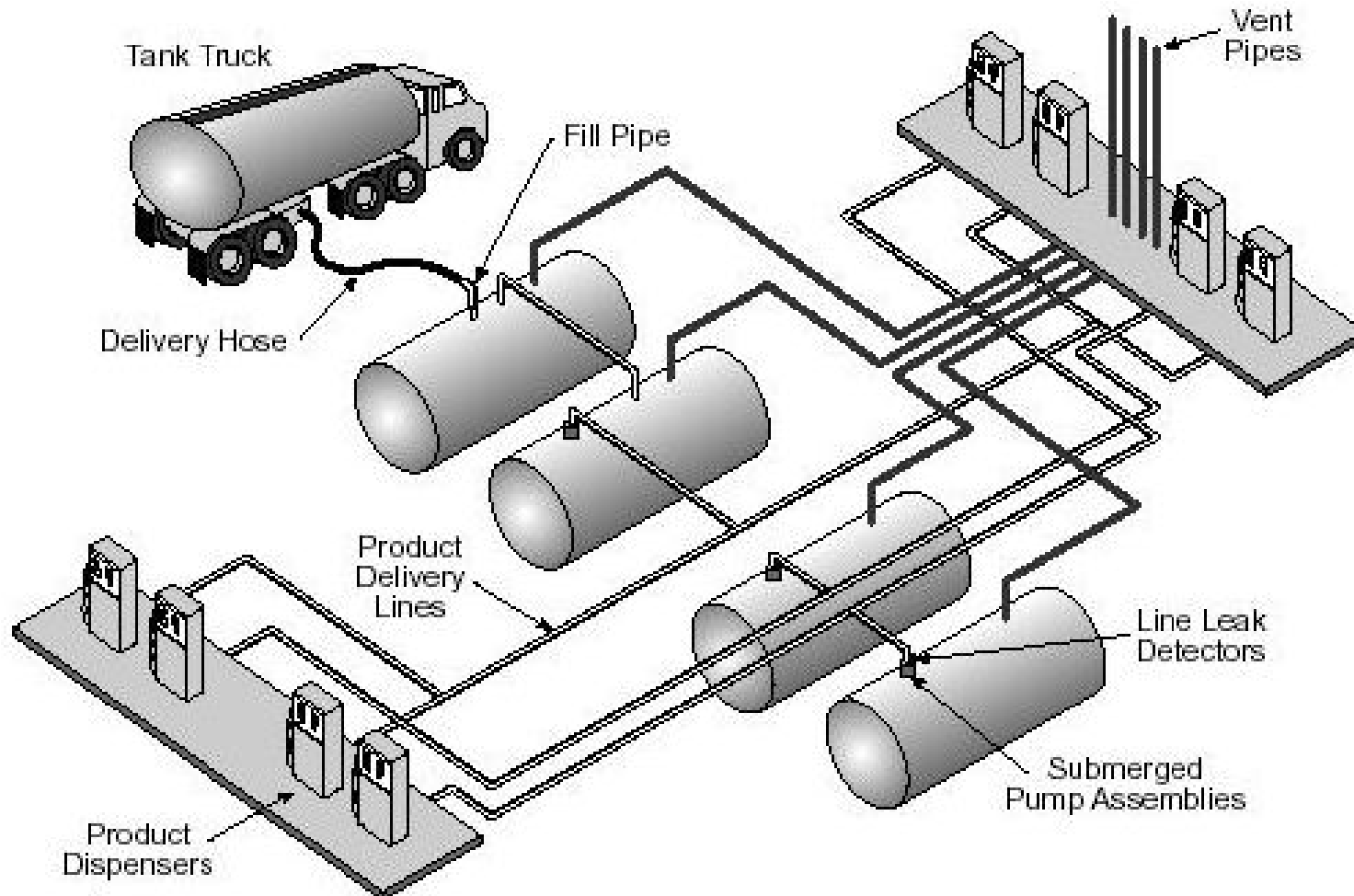
- 1 . What equipment is at your facility.
- 2 . What must be done,
- 3 . When it must be done,
- 4 . What you must have for an inspection.

Understanding Your UST System

An Underground Storage Tank (UST) system contains:

- **One or more Tanks**
- **Piping**
- **Spill Prevention**
- **Overfill Protection**
- **Corrosion Protection**
- **Leak Detection Systems**

A Typical UST System



We Will Also Cover...

- **Notification**
- **Repairs**
- **Release Reporting**
- **Tank Closure**
- **Record Keeping**
- **Financial Responsibility**

Know Your Options

- **Tank options**
- **Piping options**
- **Spill Prevention options**
- **Overfill Prevention options**
- **Corrosion Protection options**
- **Leak Detection System options**

Tank Options (4)

- **Cathodically Protected Steel Tanks**
- **Fiberglass-clad Steel Tanks**
- **Jacketed Steel Tanks**
- **Fiberglass Reinforced Plastic (FRP) Tanks**

Disclaimer

the fine **print**

Any brand names mentioned or depicted of any equipment, products, or services in this presentation used for illustrative purposes only and are neither endorsements nor recommendations for such equipment, products, or services and should not be construed as such.

The State of Tennessee does not endorse any specific brands, manufacturers, or vendors of equipment, products or services.



Cathodically Protected Steel Tank

An example of a coated and cathodically protected steel tank is the sti-P3[®] tank.

This tank has a dielectric coating on the outside and has galvanic (sacrificial) anodes attached to the outside of the tank.



Clad Steel Tank

A steel tank that has a thick layer of non-corrodible material such as fiberglass or urethane mechanically bonded (clad) to the outside of the tank.

The cladding helps protect the outside of the steel wall from corroding.

Examples of clad tank brands include:

ACT-100®,
ACT-100-U®,
Glasteel®, and
Plasteel.



Sample Clad Tank

Clad Steel Tanks Being Installed

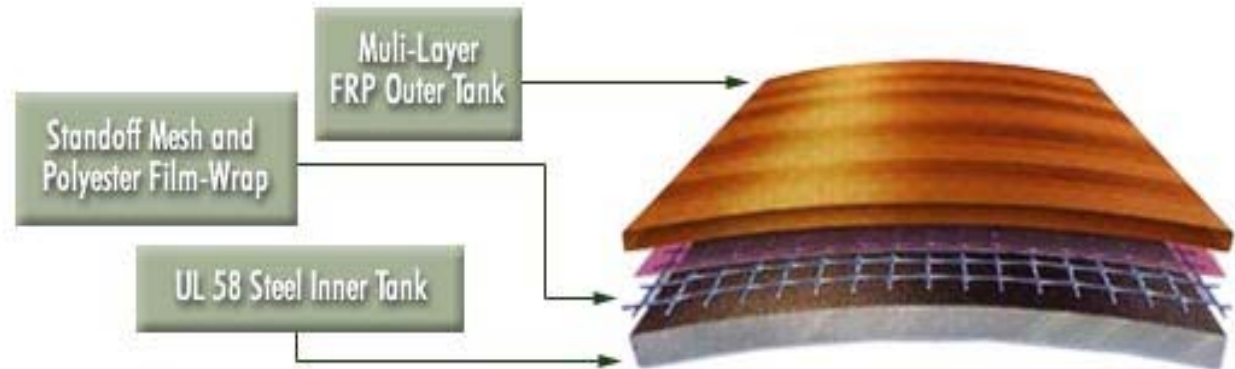


Jacketed Steel Tank

A steel tank that is encapsulated (or jacketed) in a noncorrodible, nonmetallic material such as fiberglass or polyethylene.

This tank is secondarily contained. There is a space between the steel wall and the jacket material. This space may be monitored for a breach of either wall.

Examples of jacketed Tank brands include:
Permatank®,
Glasteel II®,
Titan®, Elutron®,
Total Containment®



Fiberglass Reinforced Plastic (FRP) Tank

This tank is made of fiberglass reinforced plastic.

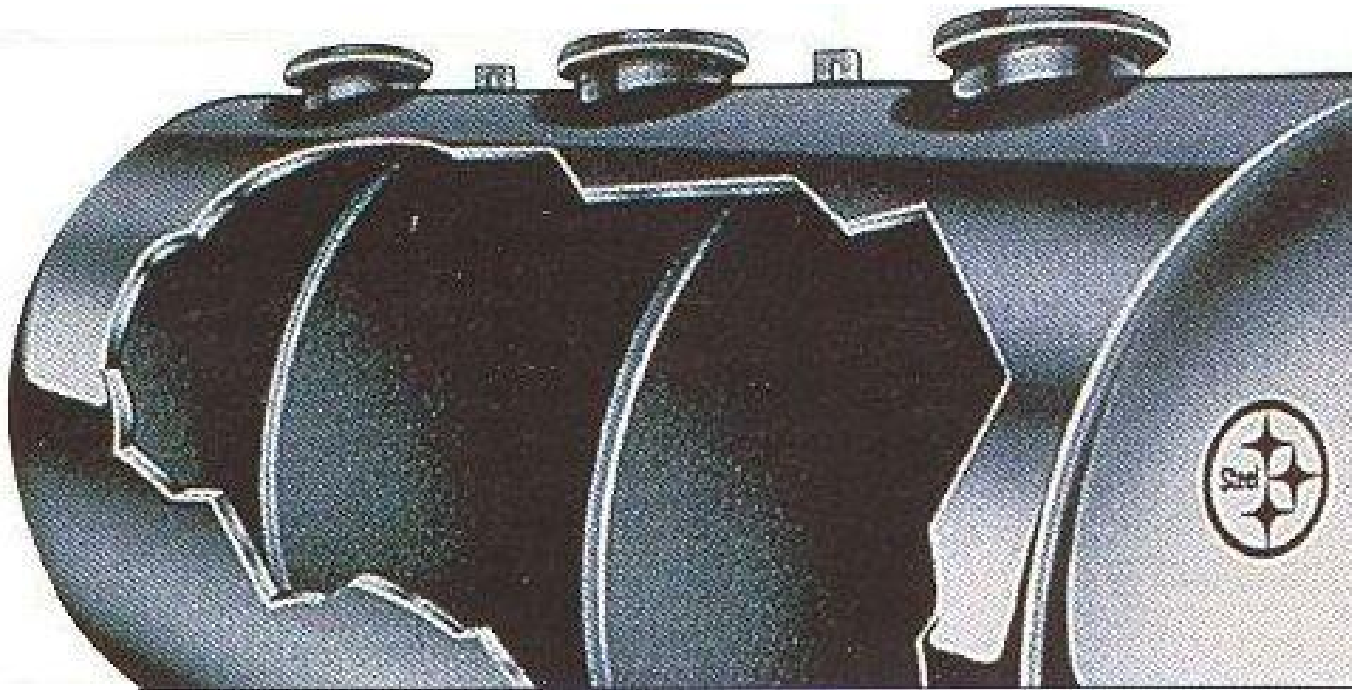
FRP tanks were made by Owens Corning, Xerxes, Cardinal, Fluid Containment, and Containment Solutions.



Some Special Cases...

• Compartment Tanks

Tanks which are divided into **two or more compartments**. These usually hold different product grades; i.e., Regular & Premium



Some Special Cases...

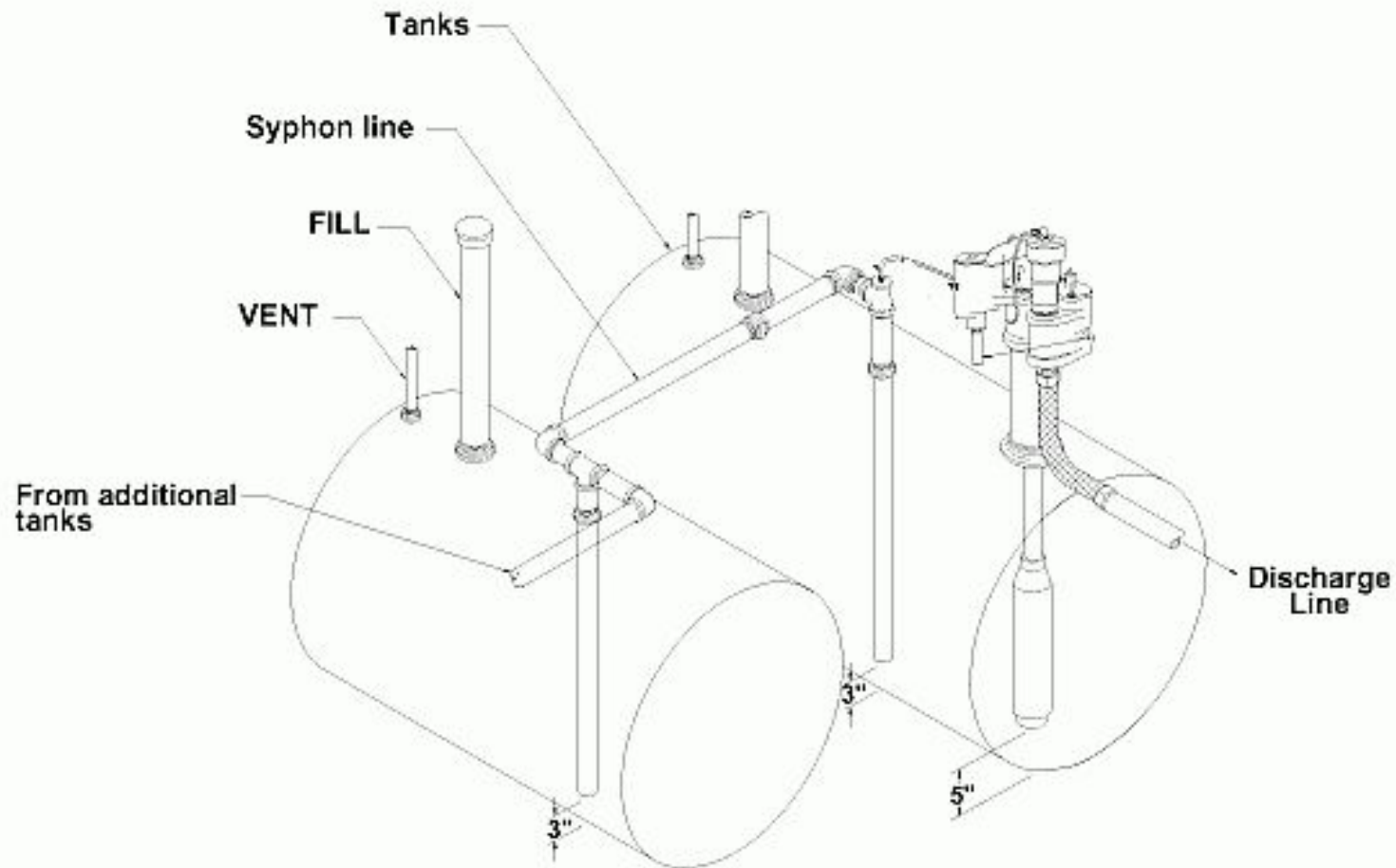
- **Manifolded Tanks**

Two or more **tanks connected by piping**. These usually hold the same product grade.

- **Double Wall Tanks**

A tank with two shells (a tank within in a tank)

Manifold Tanks



Piping Options (3)

- **Cathodically Protected Steel Piping**
- **Fiberglass Piping**
- **Flexible Plastic Piping**

Fiberglass Reinforced Plastic Piping (FRP)

This piping is nonmetal and is made of fiberglass reinforced plastic. It is rigid piping (not flexible).

FRP piping makers include Ameron and Smith Fiberglass Products.



Sample FRP Piping

Flexible Plastic Piping

Flexible piping brand names include: Poly-Tech, Dualoy 3000, EnviroFlex, GeoFlex, Perma-Flexx, Omniflex, and Co-FlexTMTitan®, Total Containment®, and Elutron®.



Sample Flexible Piping



Sample Flexible Piping



Sample
Flexible
Piping



Sample Flexible Piping
In A Sump



Close-up Of Flexible Piping In A
Sump

How Do You Know What Is Present?

- **Installation Records**
- **Visual observation**
- **Testing**
- **Previous Inspection Records**

Can You Identify....?



What Kind of Piping is This?



Questions:

- ✓ Do you know what you have at your facility?
- ✓ Do you know what an upgraded tank or upgraded piping is?

Upgraded tanks /piping

You may have tanks or piping that was upgraded prior to December, 1999.

Upgraded systems are:

- **Bare steel** tanks with an Impressed Current cathodic protection system added for corrosion protection.
- Steel piping with an Impressed Current cathodic protection system, sacrificial anodes added, OR replaced with **fiberglass** or **flexible plastic piping**.
- Spill and overflow prevention added.

We Have Covered...

- ✓ **Tank Options**
- ✓ **Piping Options**

Next:
Spill Prevention

What You Should Know About Spill Prevention

- Any tank filled with **25 gallons or more** at one time **MUST** have spill prevention.
- Spill prevention devices must prevent spills that may occur when the delivery hose is disconnected from the fill pipe.
- They are commonly called “spill buckets” or “catchment basins”.
- They are **not** designed to hold product for long periods of time.
- Some have drain valves to allow product to drain into the tank.
- When spill bucket contents are drained into a tank, any collected water or debris *may also enter the tank*.

Examples of Spill Prevention



Spill Prevention

You should:

- Periodically check to see if your spill bucket will hold liquid.
- Periodically inspect your spill bucket for signs of wear, cracks, or holes.
- Make sure your spill bucket is empty of liquid and debris before and after each delivery.

What's Wrong With This?



Check your understanding

✓ Which tanks do NOT have to have spill buckets?

Tanks filled with 25 gallons or less *at one time*, like waste oil tanks

✓ Do you have proper spill buckets on your tanks?

✓ Are they in good working order?

You should be able to answer “Yes” to these questions

We Have Covered...

- ✓ **Tank Options**
- ✓ **Piping Options**
- ✓ **Spill Prevention**

Next:
Overfill Prevention options

Overfill Prevention

- Any tank that is filled with **25 gallons or more** *at one time* **MUST** have overfill prevention.
- Overfill prevention is to prevent tanks from being overfilled during delivery.
- Overfill prevention is designed to either:
 1. stop product flow, or
 2. reduce product flow, or
 3. alert the delivery person before the tank becomes full and begins releasing product

3 Types of Overfill Prevention

The 3 most common types of overfill prevention:

☞ **Automatic Shutoff** (sometimes called 'flapper valves')

☞ **Flow Restriction** (sometimes called 'ball floats')

☞ **Overfill Alarm** (sometimes called 'high level alarms')

Let's examine each type...

Automatic Shutoff Devices

- An **automatic shutoff device** slows down and stops product flow when the product has reached a certain level in the tank. Automatic shutoff devices are located **in the fill pipe**.
- Look down the fill pipe to see part of this device.
- You will see what appears to be a line cutting through the fill pipe (or a half moon shape in your fill pipe).

Examples of Automatic Shutoff Devices

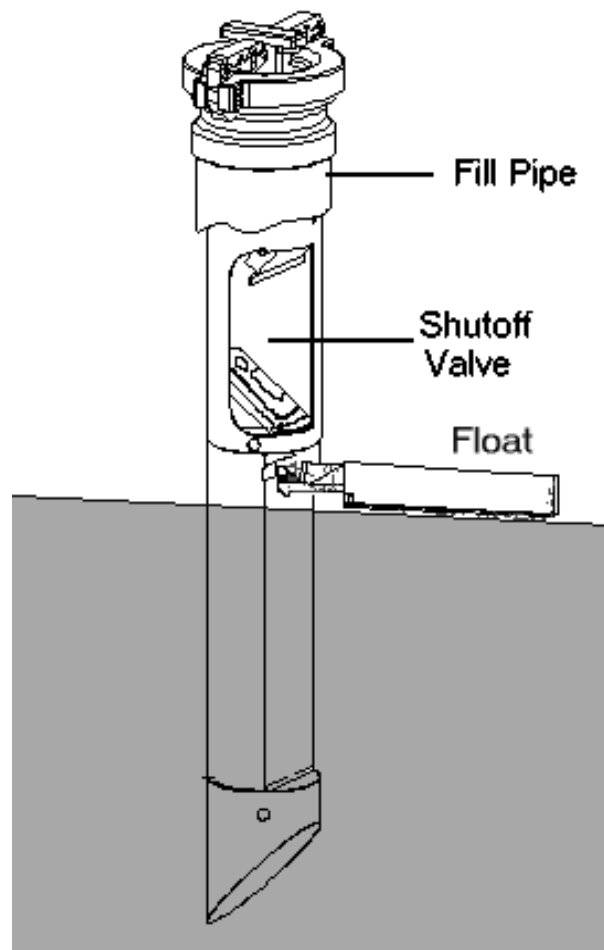
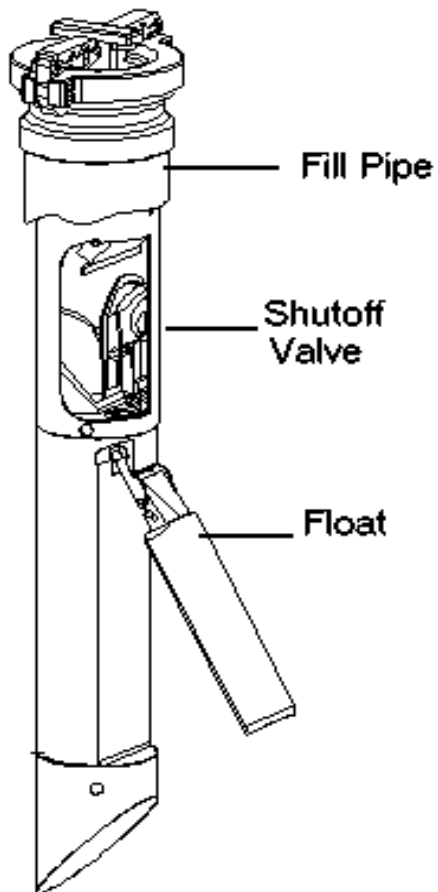


Looking Through The
End Of Automatic
Shutoff Device



Looking Down A Fill
Pipe At An Automatic
Shutoff Device

How Automatic Shutoff Devices Work



Examples of Automatic Shutoff Devices



What we don't want to see...

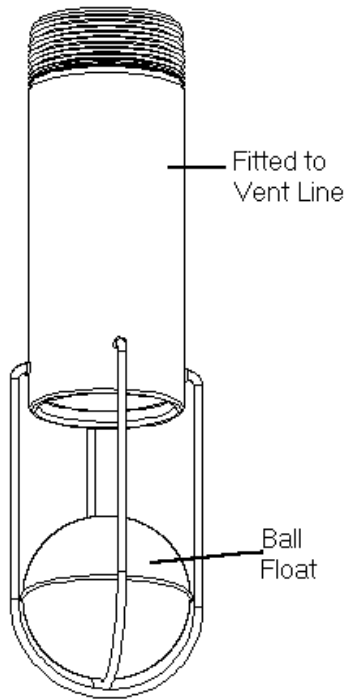
Tank Gauging sticks left in the fill pipe disables the overfill protection for these tanks



Ball Float Valves

- A ball float valve is located inside the tank in the vent piping.
- As the tank fills, a ball in the valve rises and restricts the flow of vapors out of the tank.
- The flow rate decreases and alerts the delivery person to stop the delivery.
- Ball float valves are not easily seen.
- Ball float valves may not be used in all tank applications.
- Facility records may indicate whether a tank has this device, or the contractor who installed the tanks may know if they are present.

Examples of Ball Float Valves



Sample
Ball Float
Valve



Close-up Of Extractor
Port

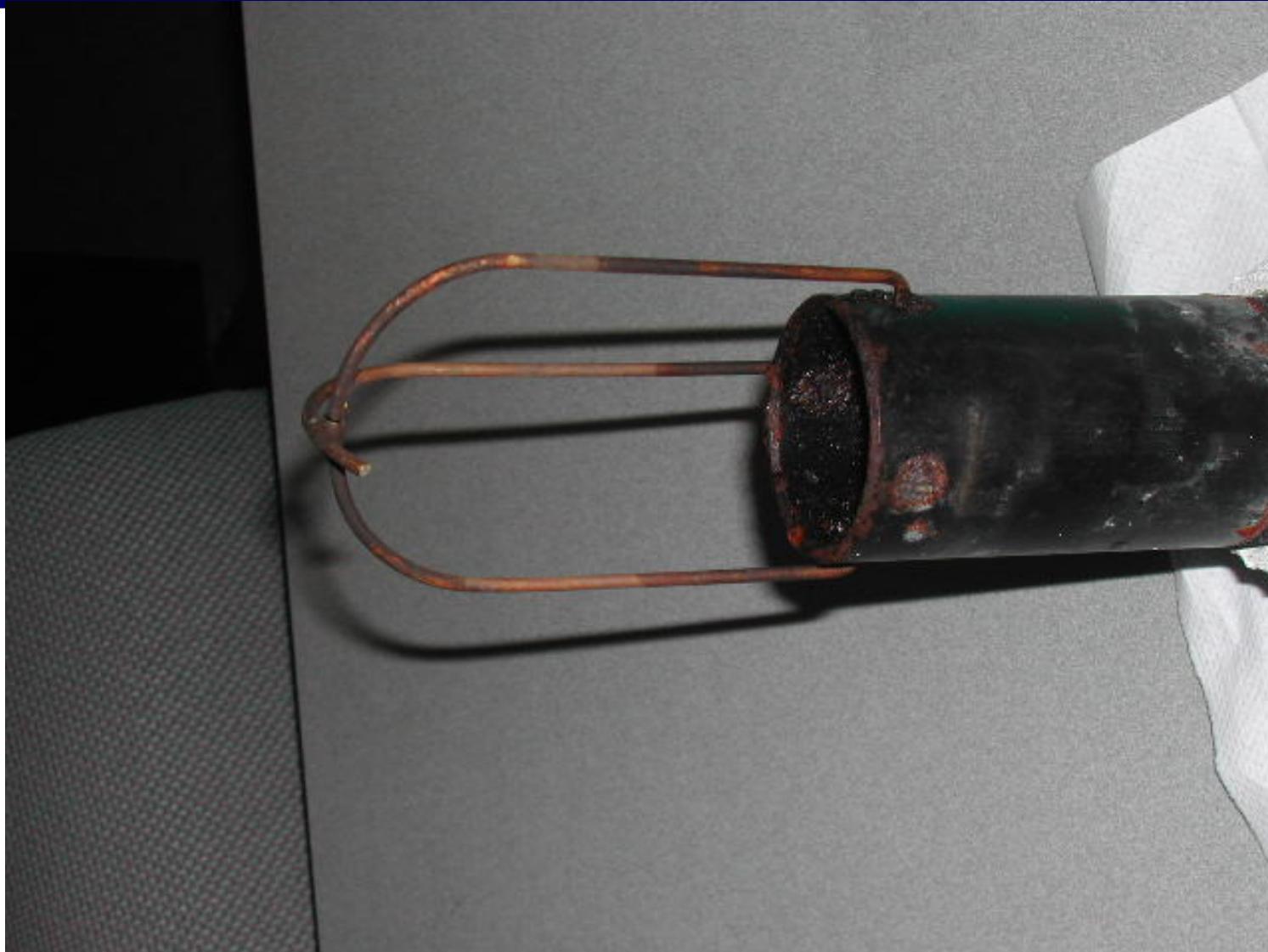


Ball Float Valve



**Ball float
valve as
seen
from
inside the
tank**

Damaged Ball Float Valve



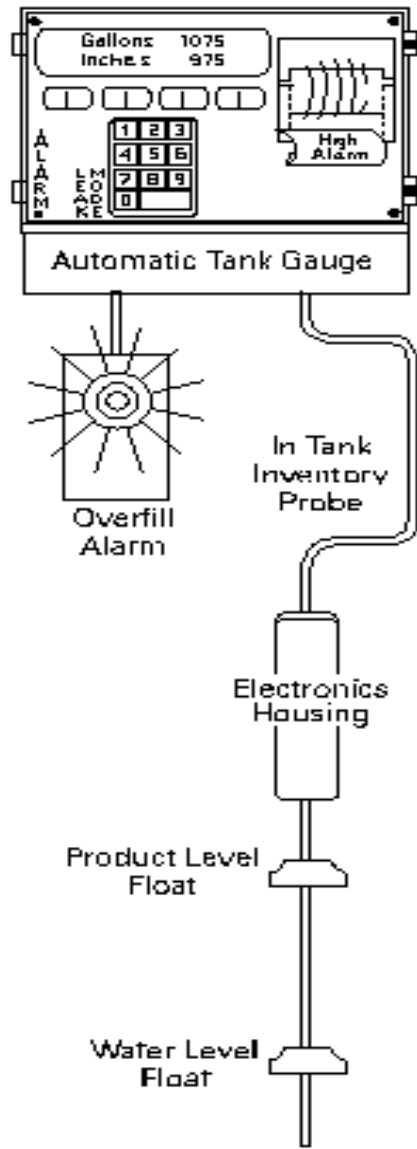
**Wire
restraining
cage is
broken and
ball is
missing.**

**No overfill
protection**

Overfill Alarms

- An overfill alarm uses a sensor in the tank connected to an automatic tank gauge (ATG).
- An overfill alarm provides a warning when the tank is close to being full that can be seen or heard (or both) by the delivery person.
- When the alarm activates, the **delivery person** should **stop the flow** of product to the tank immediately.

Examples of Overfill Alarms



Sample Overfill Alarm



These signaling devices must be located where the delivery driver can see and hear them to know when to stop delivery

Overfill Protection

**There is one means of overfill protection that
always works.....**

and we haven't discussed it.

Do you know what it is?

Overfill Protection

1200-1-15-.03(1)(a)

“Owners and/or operators shall ensure that releases due to spilling or overfilling do not occur. The owner and/or operator shall ensure that the volume available in the tank is greater than the volume of petroleum to be transferred to the tank before the transfer is made and that the transfer operation is monitored constantly to prevent overfilling and spilling.

Overfill Protection

Tank owners should always know how much empty space volume (called 'ullage') is available in the tank before ordering product.

Tank owners should also allow for the empty space at the top of the tank that must remain empty because of the overfill protection devices.

Calculating Delivery Amounts

Problem

Owner has:
10,000 gallon tank with
Flapper valve overfill device,

5000 gallons of product
remaining in tank

What is the maximum amount
of fuel that should be
ordered?

Solution

10,000 gallon tank
– 5,000 gallons remaining in tank
5,000 gallons ullage

Flapper valve overfill device activates
when tank is 95% full, so 5% of
10,000 = 500 gallon space which
cannot be used

5,000 gallons ullage
– 500 gallons
4,500 gallons maximum



Check your understanding

✓ How do the 3 types of overfill prevention devices function?

1. Stop flow, 2. Reduce flow, 3. Alarms to alert driver

✓ Which tanks are NOT required to have overfill prevention?

Tanks filled with 25 gallons or less *at one time*, like waste oil tanks

✓ Which overfill device can be seen by looking in the fill pipe?

Flapper valve (automatic shutoff)

✓ Do you have overfill prevention on all your tanks?

We Have Covered...

- ✓ **Tank Options**
- ✓ **Piping Options**
- ✓ **Spill Prevention**
- ✓ **Overfill Prevention**

Next:
Corrosion Protection options

Corrosion Protection For Tanks and Piping

All regulated underground tanks *and* piping must be protected from corrosion

Some kinds of underground tanks and piping do not need *additional* corrosion protection.

Tanks that do **NOT** need Additional Corrosion Protection

- ✓ **Fiberglass-clad Steel Tanks**
- ✓ **Jacketed Steel Tanks**
- ✓ **Fiberglass Reinforced Plastic (FRP) Tanks**



Piping that does **NOT** need Additional Corrosion Protection

- ✓ **Fiberglass Piping**
- ✓ **Flexible Plastic Piping**



Tank and Piping that **DO** need Additional Corrosion Protection

- Any bare steel tanks or piping*
- **Steel Flex Connectors** associated with piping

* bare steel tanks and piping which have not already been upgraded either by adding cathodic protection or lining may no longer be upgraded. They must be closed or replaced. **Very Important**

Here's Why: Steel Corrodes



**“point
corrosion”
acts like a
drill on
metal
surfaces**

Tank and Piping that **DO** need Additional Corrosion Protection



**Metallic
components
need
protection**

4 ways to Achieve Corrosion Protection

- 1. Galvanic (Sacrificial Anodes) Cathodic Protection**
- 2. Impressed Current Cathodic Protection**
- 3. Internal Tank Lining**
- 4. Combination of 2. & 3.**

1. Galvanic (Sacrificial Anodes)

- **Galvanic** (sacrificial anode) **systems** use buried anodes attached to underground tanks or piping.
- A galvanic system cannot be seen and there is no rectifier.
- Anodes are installed at the factory (such as on the sti-P3® tank) and can be installed on piping and other underground metal components in the field.

1. Galvanic (Sacrificial Anode) System



Tank with galvanic (sacrificial) anode

Coated And Cathodically Protected Steel Tank

- Has a factory applied external coating and cathodic protection.
- An example is the sti-P3[®] tank.
- These tanks may have impressed current cathodic protection added later if additional corrosion is needed.
- This tank uses a galvanic (sacrificial anode) system.



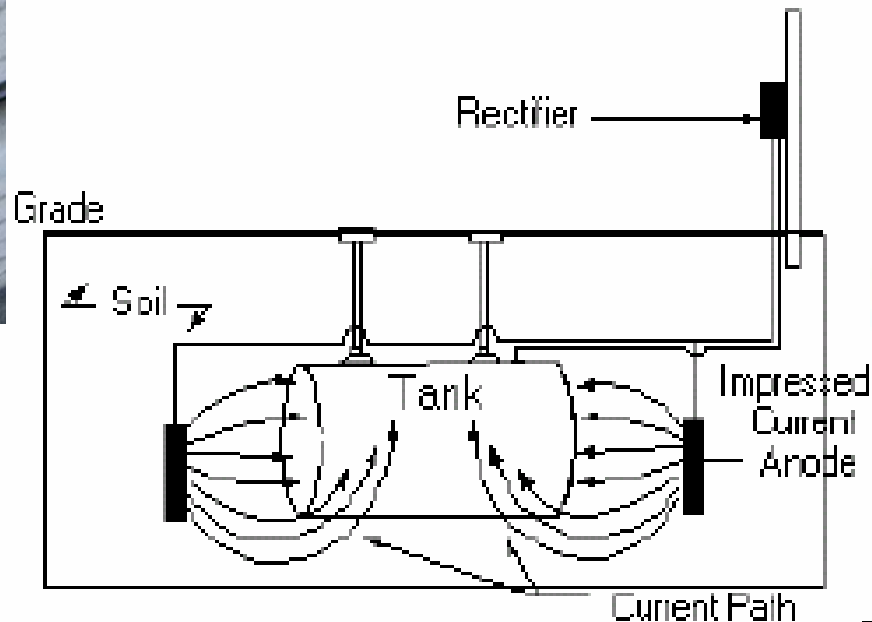
2. Impressed Current System

- **Impressed current** cathodic protection systems use a **rectifier** to provide current to the tank, piping, or other components for corrosion protection.
- The rectifier is always located somewhere at the facility. May be inside or outside the building.
- Electric power to the rectifier must be on continuously.
- Impressed current cathodic protection systems are always installed in the field.

2. Impressed Current System Rectifier Boxes



2. Impressed Current System



Sample Impressed Current System Diagram



Sample Rectifier

3. Internally Lined Steel Tank

This is a steel tank with an **internal lining** being applied to the inside wall of the tank.



Sample Of A Tank's Interior Being Lined

Requirements For Internally Lined Steel Tanks

Within **10 years** of lining, lined tanks must be internally inspected.

After the 10-year inspection, inspections must be conducted at least every 5 years,

however,

There is One Exception...

Inspecting Internally Lined Steel Tanks

Lined tanks **do not** have to have an internal lining inspection if:

1. Cathodic protection is added **before** the lining is 10 years old,




AND

2. The integrity of the steel tank is ensured when cathodic protection is installed.

***** Call for Division guidance before adding cathodic protection to a lined tank.**

If you have Internally Lined Steel Tanks

YOU MUST KEEP:

-  All records of the lining installation and manufacturer's warranty.
-  All records of any repairs made to the tank or lining.
-  All records of lining inspections.

4. Internally Lined And Cathodically Protected Steel Tank

A tank may have **both** an internal lining and a cathodic protection system.

Cathodic protection may be either impressed current or galvanic (sacrificial) anodes.

Steel Flex Connectors

Steel **flex connectors** must be protected from corrosion by one of the following:

- **Isolating the flex connector** from direct contact with the soil by putting **a protective covering or boot** on the flex connector or by removing soil in contact with the flex connector;

OR

- **Adding Cathodic Protection** to the flex connector

Protecting Steel Flex Connectors

driving rod anode



**shrink wrap boot isolates
flex connector from soil**

Steel Flex Connectors

Bad >



< Better

Cathodic Protection Testing

Both galvanic and Impressed Current cathodic protection systems must be tested periodically by a cathodic protection tester to ensure they are working properly.

Cathodic Protection Testing

For Galvanic (Sacrificial Anode) Systems:

- ➔ A test must be conducted within six months of installation and then at least every three years.
- ➔ Records of the last two cathodic protection tests must be kept.

Cathodic Protection Testing

For Impressed Current cathodic protection systems:

The **rectifier** must be inspected at least every 60 days to make sure it is on and operating properly.

→ Keep records of the last two cathodic protection tests,

AND

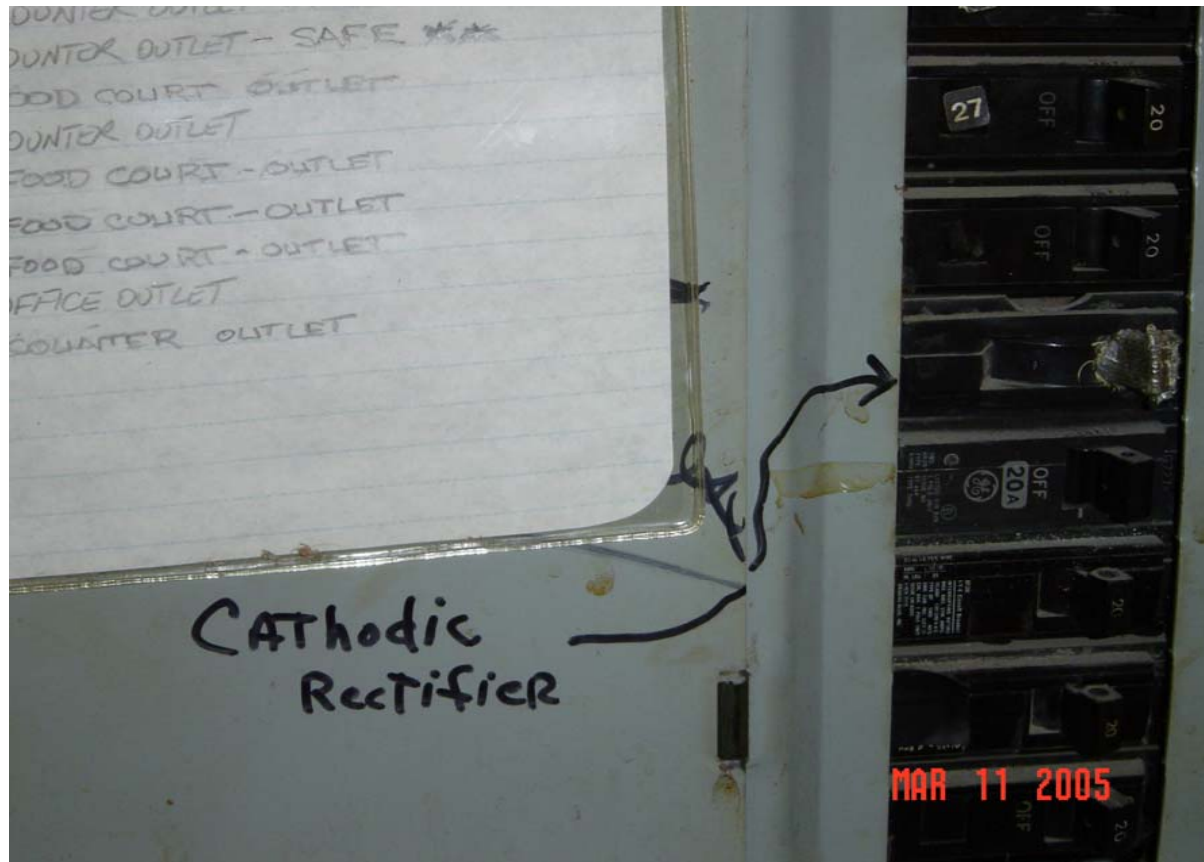
→ Keep records of the last three rectifier inspections.

What You Must Remember About Cathodic Protection

1. Cathodic protection systems must operate continuously and protect all metal tanks and piping in contact with the ground,
2. Cathodic protection systems must be tested:
 - a. within 6 months of installation
 - b. within 6 months of any repair to the CP system
 - c. every three years.
3. IC Rectifiers must be checked every 60 days

CP System Power

The Impressed Current Cathodic Protection system should be on a separate circuit from other electrical components.



Checking the CP Rectifier



Check your understanding

- ✓ What is the difference between Galvanic and Impressed Current Cathodic Protection?

Galvanic- factory installed anodes; IC-field installed, uses rectifier

- ✓ Which tanks and piping are NOT required to have corrosion protection?

Fiberglass, fiberglass clad, jacketed tanks; fiberglass and flexible plastic pipe

- ✓ How often must Cathodic Protection systems be tested?

Every 3 years, rectifiers checked every 60 days

- ✓ Do you know if your tanks and piping have CP, and has it been tested?

We Have Covered...

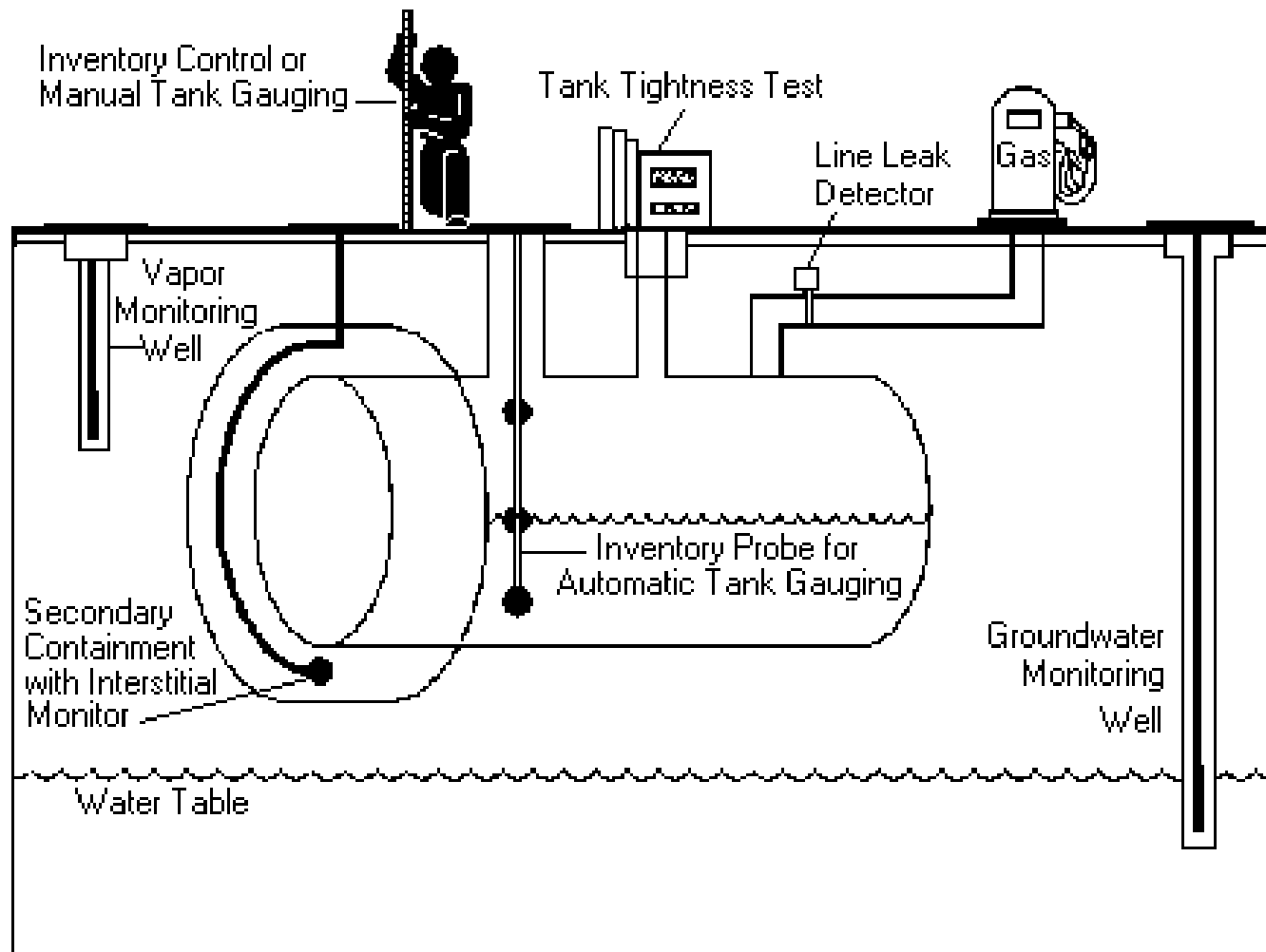
- ✓ **Tank Types**
- ✓ **Piping Types**
- ✓ **Spill Prevention**
- ✓ **Overfill Prevention**
- ✓ **Corrosion Protection**

Next:
Leak Detection Systems

Leak Detection Methods

- **Inventory Control**
- **Manual Tank Gauging**
- **Tank Tightness Testing**
- **Automatic Tank Gauging**
- **Vapor Monitoring**
- **Groundwater Monitoring**
- **Interstitial Monitoring**
- **Statistical Inventory Reconciliation**

Leak Detection Options



What You Must Know about Leak Detection

THIS IS VERY IMPORTANT:

- All regulated tanks except emergency generator tanks are required to have leak detection.
- Leak Detection must be performed every 30 days.
- Leak detection records must be kept for at least the last 12 months.

Inventory Control and Tank Tightness Testing

- **Inventory Control** is measuring daily product level in the tank, recording amounts of product pumped each day, and reconciling the data with product delivery and sales.
- A tank gauging stick is generally used to take measurements.
- This method must be combined with **tank tightness testing** every five years.
- ★ This method may only be used for up to ten years after installing a new tank or upgrading an existing tank with corrosion protection.

Inventory Control

What you must have:

- A **gauging stick or electronic monitoring device** capable of measuring the full height of the tank to the nearest 1/8 inch.
- A **drop tube** that extends to within one foot of the tank bottom for deliveries. All product deliveries must be made through a drop tube.
- Product **dispensers** that are **calibrated correctly**.
- A **tank chart** if a gauging stick is used.

Inventory Control

What You Must Do:

- Record inventory and dispenser readings each day the tank is in operation.
- Reconcile deliveries with delivery receipts by taking inventory readings **before and after** each delivery.
- Measure **water** in the tank to the nearest one-eighth inch at least **once a month**.
- Reconcile data every 30 days and record results, **AND**,
- Do a **leak check calculation** at the end of this period.
- Report all suspected releases.
- Keep the last 12 months of records.

Inventory Control

When do you have a suspected release?

- A leak is suspected when 2 consecutive months show daily overages or shortages **greater than 1.0 percent of the total monthly flow through + 130 gallons.**
- This is a failing result and **must be reported to the division within 72 hours.**

Example: Monthly flow through = 10,000 gallons

1% of 10,000 gallons = 100 gallons

100 gallons + 130 gallons = 230 gallons

Pass = Monthly over/short total less than 230 gallons

Fail = Monthly over/short total more than 230 gallons



What You Must Remember About Inventory Control

1. Measurements must be taken each day the tank is in operation.
2. Stick measurements must be reconciled with book inventory and sales every 30 days.
3. Leak calculations must be done each month.
4. Can only be used for 10 years after installation or upgrade for corrosion protection.
5. Must be combined with tank tightness testing **every 5 years.**

Tank Tightness Testing

- Must be conducted by a trained tester or by a permanently installed electronic system.
- Must be capable of detecting a 0.1 gallon per hour leak rate from any portion of the tank that routinely contains product.
- Testing method must be certified for the type and volume of product being tested.
- When using **Inventory Control**, a tank tightness test must be conducted at least once every five years.
- Keep the results of your most recent tightness test.

How much is one tenth of a gallon?

?

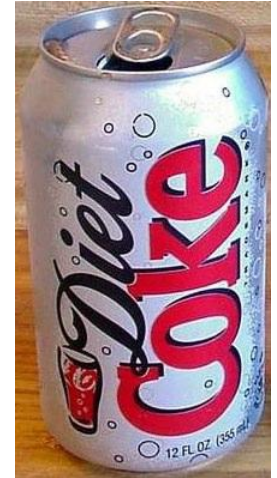


?

?



?



This is one tenth of a gallon



Check your understanding

- ✓ Impressed current cathodic protection was added to tanks in 1998.

When must these tanks begin using a monthly monitoring method?

2008

- ✓ Inventory Control is used on a tank installed in 2000, and a tank tightness test was done at installation.

When is the next tank tightness test due?

2005

Manual Tank Gauging and Tank Tightness Testing

- Manual Tank Gauging measures product level and compares readings to weekly and monthly standards to determine if the tank is tight.
- A tank gauging stick is generally used to take measurements to the nearest 1/8 inch.
- Tanks must be taken out of operation for a certain period of time each week.

Manual Tank Gauging and Tank Tightness Testing

- Manual Tank Gauging (MTG) **alone** may be used for tanks 1,000 gallons or less.
- * Tanks from 1001 gal. to 2,000 gal. **must** use **Tank Tightness Testing** *in addition* to MTG.
- ★ This method may **only be used for up to ten years** after installing a new tank or upgrading an existing tank with corrosion protection **for tanks 1001- 2000 gallons.**
- Tanks over 2,000 may **not** use MTG.

Manual Tank Gauging

What You Must Do:

- Determine how long the weekly test must be.
- **Remove tank from service** for the test period.
- Record **the average** of **two** inventory readings at the **beginning** of the test period.
- Record **the average** of **two** inventory readings at the **end** of the test period.
- Compare the difference with the standards in the chart.
- Repeat **weekly** and compare with weekly standard.
- **Average 4 weeks** and compare with monthly standard.
- Report all suspected releases.
- Keep the last 12 months of records.

Manual Tank Gauging Leak Test Standards

Tank Size	Minimum Test Period	Weekly Standard (one test)	Monthly Standard (four test average)
Up to 550 gallons (any tank diameter)	36 hours	10 gallons	5 gallons
551 – 1,000 gallons (any tank diameter)	36 hours	13 gallons	7 gallons
551 – 1,000 gallons (tank diameter = 64")	44 hours	9 gallons	4 gallons
551 – 1,000 gallons (tank diameter = 48")	58 hours	12 gallons	6 gallons
1001– 2,000 gallons	36 hours	26 gallons	13 gallons

Manual Tank Gauging Leak Test Standards

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1001– 2,000 gallons	36 hours	26 gallons	13 gallons

Manual Tank Gauging

When do you have a suspected release?

- A leak is suspected when the weekly or monthly test exceed the numbers in the chart
- This is a failing result and must be reported to the division within 72 hours.

Example: 1100 gallon tank

1st weekly test = 20 gallons, 2nd weekly test = 18 gallons

3rd weekly test = 16 gallons, 4th weekly test = 20 gallons

Average of 4 weekly tests = 18.5 gallons

Chart value = 13 gallons

Result = **Fail**



Manual Tank Gauging Leak Test Standards

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Up to 550 gallons (any tank diameter)	36 hours	10 gallons	5 gallons
551 – 1,000 gallons (any tank diameter)	36 hours	13 gallons	7 gallons
551 – 1,000 gallons (tank diameter = 64")	44 hours	9 gallons	4 gallons
551 – 1,000 gallons (tank diameter = 48")	58 hours	12 gallons	6 gallons
1001– 2,000 gallons	36 hours	26 gallons	13 gallons

What You Must Remember About Manual Tank Gauging

1. Can only be used on tanks **2,000 gallons** or less.
2. Must be combined with **Tank Tightness Testing** if tank is 1,000 gallons or larger.
3. Can only be used for 10 years for tanks **larger than 1000 gal.**
4. Both weekly and monthly standards must be met in order to pass.

Automatic Tank Gauging (ATG)

An ATG system consists of a **permanently installed probe** that collects information such as product level and temperature and a **console** inside the facility which calculates changes in product volume that can indicate a leak. The console should signal an **alarm** when there is a suspected problem. An ATG must be able to detect a **0.2 gph leak**.



ATG consoles

How much is one tenth of a gallon?

?

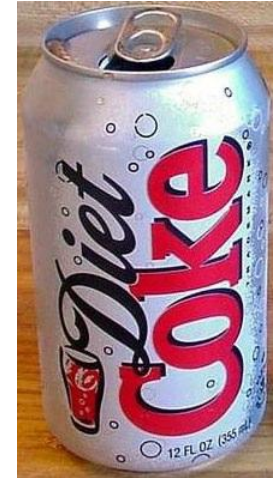


?

?



?



This is one tenth of a gallon



Monthly ATG Leak Detection

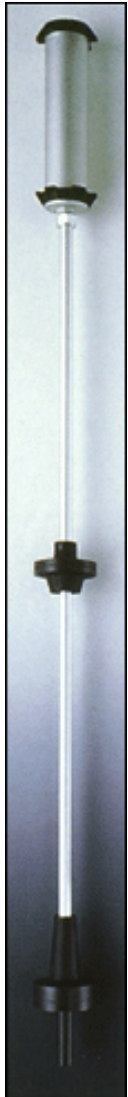
- This is the size of monthly leak an ATG must be able to detect:



Two tenths of a
gallon

0.2 gal.

Automatic Tank Gauge Components



Probes
(inside the
tank)



Console

Automatic Tank Gauge Probe Locations



Automatic Tank Gauging

What you should know about ATGs:

- Some ATGs can be programmed to automatically test every 30 days. If your ATG does not test automatically, you must take tanks out of service and conduct a leak test. (*a static test*)
- Some ATGs can conduct tank tightness tests.
- All ATGs require a certain minimum amount of product in the tank to conduct a valid test.
- Some ATGs can be combined with computer programs that allow tanks to remain in service while conducting testing This is known as **CSLD** or **CITLDS**. (good for high volume locations).
- It is **not** a good practice to rely on the ATG memory to store leak detection records. *Why?*

Automatic Tank Gauging

What you must do:

- Conduct leak test **at least once per month for each tank** if it isn't done automatically.
- Print out and keep at least **one** passing **monthly leak test result for each tank** from the ATG. ***It is best if this is done monthly.***
- Keep your ATG user manual handy.
- Pay attention to any and all alarms and respond appropriately.
- Report all suspected releases.
- Keep the last 12 months of records.

Never Ignore ATG Alarms



Vapor Monitoring

Vapor Monitoring uses portable or permanent detectors to look for vapors in **monitoring wells**.

IMPORTANT: Vapor monitoring does not work well with product that does not vaporize easily such as diesel fuel.

Two methods of vapor monitoring:

- **Manual** - using a portable hand-held device to check for vapors at each monitoring well at least once every 30 days.
- **Electronic** - permanently installed electronic sensors in monitoring wells that check continuously for the presence of vapors.

Vapor Monitoring



Photoionization
Detector (PID)

Vapor Monitoring

What you must have:

- A **site assessment** showing the site is suitable for vapor monitoring. **This is extremely IMPORTANT.**
- Properly installed monitoring wells.
- A means of measuring soil vapors.
- A method to determine if a release has occurred.

Vapor Monitoring Site Assessment

A Vapor Monitoring **site assessment** must determine that:

1. The backfill material will readily allow for vapor movement,
2. The stored product will vaporize enough to be detected,
3. Any **background contamination** will not interfere,
4. The number and placement of monitoring wells is adequate,
5. Groundwater, rainfall, soil moisture, or other interference will not allow a release to go undetected for more than 30 days.

**If these 5 things cannot be determined, vapor monitoring
cannot be used for leak detection**



Vapor Monitoring

What you must do:

- Measure for a release **at least once every 30 days**.
- Keep all vapor monitoring ports clearly marked and secured.
- Keep site assessment.
- Keep the last 12 months of records.
- Report all suspected releases.*

*A suspected release is when a continuous monitoring device signals an alarm, any liquid petroleum is observed in wells, a **significant increase** in petroleum concentration above background levels is discovered, or a tracer compound from tank is detected.

Ground water Monitoring

Ground water Monitoring uses portable bailers or electronic sensors to detect product in **monitoring wells**.

Two methods of ground water monitoring:

- **Manual** - using a bailer to check for product at each monitoring well at least once every 30 days.
- **Electronic** - permanently installed electronic sensors in monitoring wells that check continuously for the presence of product.

Ground water Monitoring



Bailing A Ground-water Monitoring Well



Sample Monitoring Well Cover

Ground water Monitoring

What you must have:

- A **site assessment** showing that the site is suitable for Ground water Monitoring. **This is extremely IMPORTANT.**
- Properly installed monitoring wells.
- A means to detect product on the ground water.

Ground water Monitoring Site Assessment

A Ground water Monitoring **site assessment** must determine that:

1. Ground water is never more than 20 feet below the surface,
2. The tank pit excavation zone does not encounter bedrock,
3. Stored product will float on water but not dissolve in water,
4. The soil is permeable enough to allow product to move to wells,
5. The wells are properly constructed, marked, and secured,
6. Monitoring device(s) must be able to detect at least 1/8" of product,
7. The number and placement of monitoring wells is adequate.

If these 7 things cannot be determined, Ground water Monitoring cannot be used for leak detection.



Ground water Monitoring

What you must do:

- Measure for a release **at least once every 30 days**.
- Keep all ground water wells clearly marked and secured.
- Keep site assessment.
- Keep the **last 12 months** of records.
- Report all suspected releases. *

*A suspected release is when an automatic or continuous monitoring device signals an alarm, or **any liquid product** is observed on top of ground water in a monitoring well.

What You Must Remember about Vapor or Ground water Monitoring

1. You **MUST** have a **site assessment** showing the site is suitable for ground water monitoring.
2. You **MUST** have wells properly installed, marked, and secured.
3. You **MUST** have a device capable of detecting a release.

Interstitial Monitoring using Secondary Containment

Interstitial monitoring monitors the space between a tank wall and a barrier between the tank and the environment.

The space between the barriers is called the **interstitial space** and can be monitored manually or electronically.

The outer barrier is often called “**secondary containment**”.

This method must be capable of detecting a release from the **inner wall** of a tank.

- Examples of Secondary Containment include:
 - ✓ The outer tank wall of a double-walled system
 - ✓ An excavation liner (very uncommon)
 - ✓ Bladder inside the tank (very uncommon)

Interstitial Monitoring using Secondary Containment

This is a double wall tank.

The space between the walls
is the interstitial space.

It can be monitored in several
ways.

Interstitial Monitoring may
also be used for piping with
secondarily contained piping.

Electronic sensors, vacuum, pressure,
or liquid may be used to monitor
the interstitial space.



Interstitial Monitoring

What you must have:

- If you have a double wall tank or a tank bladder (liner) you must have a method of detecting a leak from the inner wall.
- If you have an tank pit excavation liner you must have a method of detecting a leak from the tank. (wells inside the tank pit liner).

These applications are *rare*.

Interstitial Monitoring

What you must do:

- Measure for a release **at least once every 30 days**.
- If using electronic sensors, check periodically to make sure they are working properly. (at least annually)
- If using liquid-filled or sealed pressure/ vacuum system, check user's manual periodically to determine if system is remaining within correct parameters.
- Keep the last 12 months of records.
- Report all suspected releases.

Statistical Inventory Reconciliation (SIR)

- **SIR** uses a computer program to perform a statistical analysis of inventory, delivery, and dispensing data every 30 days. A gauging stick or ATG is used to gather inventory data.
- **SIR** uses the same data collection procedures as **Inventory Control**. (daily 1/8 inch measurements, monthly water readings, annual meter calibration, deliveries through drop tubes)
- SIR may be conducted by a **SIR vendor** for the tank owner, or by a tank owner using a SIR computer program.
- SIR results must be reported as ***pass, fail, or inconclusive***.
- SIR results apply only for monthly leak detection for tanks **and** piping.

Statistical Inventory Reconciliation (SIR)

Inventory data is sent to a **SIR vendor** (or entered in an owner-operated computer program) at least once every 30 days. If data is submitted, a vendor provides results after the statistical analysis is completed.

You must keep **complete** SIR records.

Complete SIR records consist of: the monthly SIR result, **plus** raw data gathered (stick readings, sales, water readings, etc.)

Statistical Inventory Reconciliation (SIR) Inconclusives

If an **inconclusive** monthly result is received, you must **investigate immediately** and correct the problem.

The problem might be poor measurements, miscalibrated meters, missed deliveries, or something else. Document results of the investigation and keep with leak detection records.

- An **inconclusive** result means you have **not** received a passing leak detection result for the month.
- If you receive **inconclusive** results for **2 consecutive months**, it is a **suspected release**, and must be reported within 72 hours.

Statistical Inventory Reconciliation (SIR)

What you must have:

- A contract with a SIR provider to analyze monthly leak detection records, or a SIR program which can be operated on your computer which does SIR analysis.
- A means to collect product inventory data (gauging stick, or ATG) on a daily basis.
- A means to convert measurements to gallons (tank chart).

Statistical Inventory Reconciliation (SIR)

What you must do:

- Collect and record adequate inventory data every 30 days using inventory control data collection requirements.
- Have records analyzed **every 30 days** either by SIR provider or owner-operated SIR computer program.
- Investigate, determine the reasons, and correct the causes for any **inconclusive** results.
- Keep the last 12 months of records.
- Report all suspected releases.

Check your understanding

- ✓ What should you do if you receive a SIR inconclusive monthly result?

Investigate, and correct any sources of error found. Consult with SIR vendor for suggestions, recheck math, possibly check meter calibration, etc.

- ✓ What should you do if you receive a second consecutive monthly SIR inconclusive result?

Investigate as before, AND report this as a suspected release to the Division within 72 hours

- ✓ What should you do if you receive a third consecutive monthly SIR inconclusive result?

Same as above, plus do a tank and line tightness test

We Have Covered...

- ✓ **Tank Types**
- ✓ **Piping Types**
- ✓ **Spill Prevention**
- ✓ **Overfill Prevention**
- ✓ **Corrosion Protection**
- ✓ **Leak Detection Systems**

Next:

Piping Leak Detection

Piping Leak Detection

Two types of piping systems:

- A. Pressurized
 - B. Suction
- > Leak detection requirements differ depending on whether piping is pressurized or suction. You must know the difference.

We will look at each type.

First,

Pressurized Piping

Pressurized Piping

- Uses a **submersible turbine pump** (STP) located inside the tank that pushes product to the dispenser.
- A pressurized piping system should have a STP head in a sump above the tank.
- These sumps are covered with a lid and may also have a sump cover under the lid.

Pressurized Piping Sump



Submersible Turbine (STP) Heads



Submersible Turbine Pump



Pressurized Piping Requirements

Pressurized piping **must** have **two** forms of Leak Detection:

1. **Catastrophic**- to prevent large sudden releases
2. **Periodic**- to prevent smaller less noticeable releases

Let's look at each kind....

Pressurized Piping Requirements

Catastrophic line leak detection is done by Automatic Line Leak Detectors (LLDs or ALLDs). ALLDs may be either mechanical or electronic.



Automatic Line Leak Detectors

- ALLDs are located on the submersible turbine pump (STP) head in the sump above the tank.

The two types of ALLDs are:

- **Mechanical**- pressure valves that test for piping leaks each time someone tries to pump fuel.
- **Electronic**- electronic detector that communicates with an ATG control panel.

Automatic Line Leak Detectors



< Electronic
Line leak
Detector



Automatic Line Leak Detector Requirements

- ALLDs must be tested at least every 12 months.
- ALLDs must perform according to the manufacturer's specifications, If they do not, they must be replaced.
- ALLD test results must be kept for at least one year.

Pressurized Piping Requirements

Periodic *line leak detection* must be done either monthly or annually.

You have three choices:

1. *Monthly Monitoring, or*
2. *Annual Line Tightness Testing, or*
3. *Electronic Line Leak Detectors*

Pressurized Piping Requirements

1. *Monthly Monitoring*

If you choose a monthly method*, you must use one of four tank leak detection methods.

Acceptable methods are:

- Vapor Monitoring
- Ground Water Monitoring
- Interstitial Monitoring
- SIR

*If you use a *monthly tank method* for piping, the rules which apply to tanks also apply to piping.

Pressurized Piping Requirements

2. Annual Line Tightness Test

If you do **not** use a monthly method for piping, you may choose to conduct an

Annual line tightness test

for pressurized piping

Line Tightness Test



Pressurized Piping Requirements

3. Electronic Line Leak Detectors

- These devices communicate with an ATG console at the facility.
- They are capable of detecting both a 3.0 gph catastrophic leak as well as performing periodic 0.2 gph and 0.1 gph line tests.
- They must be programmed to shut down the submersible pump whenever catastrophic line leaks are detected.

Pressurized Piping Summary

Pressurized Piping Leak Detection requires one from **Column A**, **AND** one from **Column B**

Column A		Column B (choose one)
Automatic Line Leak Detector	AND	Annual Line Tightness Test or
		<u>Monthly:</u>
		Vapor Monitoring
		Ground water Monitoring
		Interstitial Monitoring
		SIR

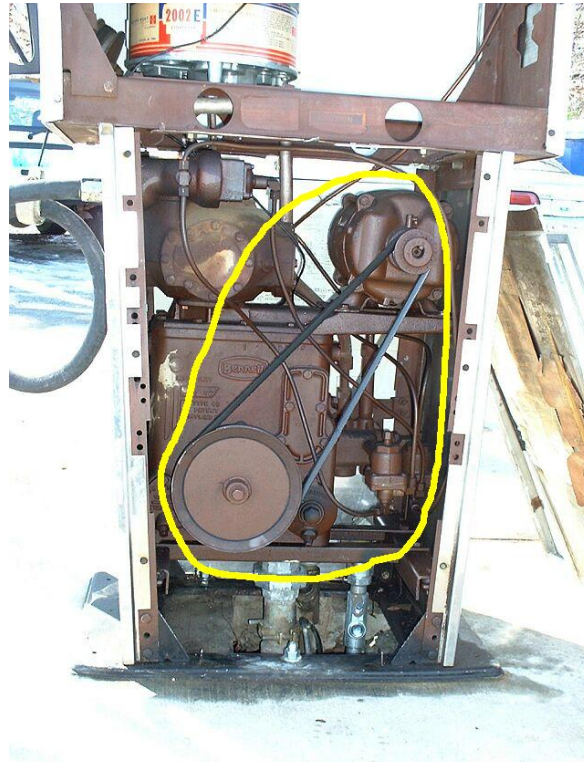
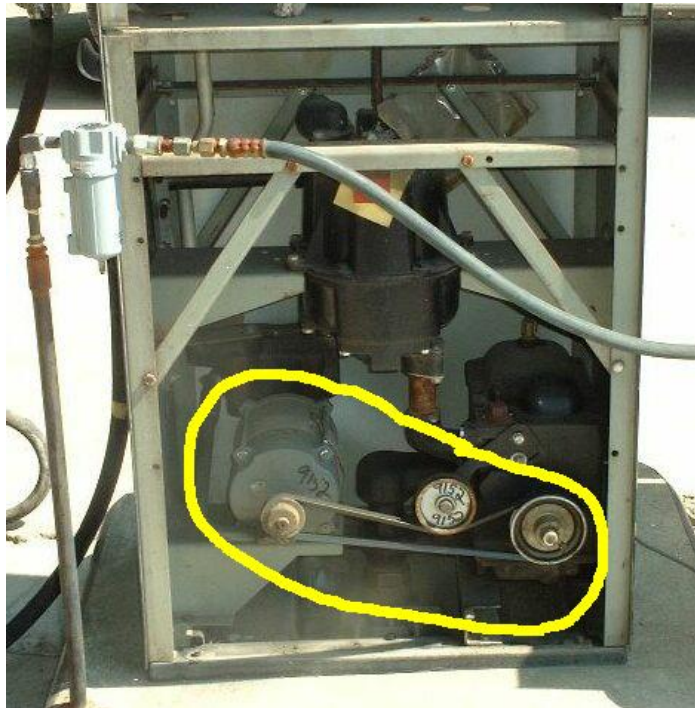
OR

An **Electronic Line Leak Detector** capable of doing both Column A and Column B

Suction Piping

Pulls product from the tank using a suction pump in the dispenser. Suction piping is found by looking for a suction pump (pulleys and belts) inside the dispenser.

There is no STP pump head in a sump above the tank.



“Safe Suction”

a.k.a. ‘European Suction’

Leak detection is NOT required for suction piping that meets both the following conditions:

- The *pipng is sloped* so product will drain back to the tank if suction is lost;

AND

- There is *only one check valve* located near the suction pump beneath the dispenser (and **not** at the tank)

Piping that meets these criteria is called “**safe suction**”.

If these criteria are not met,
leak detection is required for suction piping.

Suction Piping Leak Detection

If you do not have “**safe suction**”, you must have

Suction Piping Leak Detection

Choose one from **Column A**, **OR** one from **Column B**

Column A		Column B (choose one)
Line Tightness Test <u>Every 3 years</u>	OR	<u>Monthly:</u>
		Vapor Monitoring
		Ground water Monitoring
		Interstitial Monitoring
		SIR

What You Must Know About Piping Leak Detection

- > Know how to tell the difference between pressurized piping and suction piping.
- > Pressurized piping must have two forms of leak detection.
- > Suction piping does not require leak detection *if it meets certain requirements.* (**safe suction**)
- > Piping associated with an emergency generator tank is not required to have leak detection.

Check your understanding

- ✓ Do you know what kind(s) of leak detection you have for your tanks and piping?
- ✓ Do you have pressurized or suction piping and know the requirements for each type?
- ✓ Do you know how long you must keep leak detection records and what records to keep?
- ✓ Do you know when you must report a suspected release?

You should be able to answer “Yes” to all these questions



We Have Covered...

- ✓ **Tank Types**
- ✓ **Piping Types**
- ✓ **Spill Prevention**
- ✓ **Overfill Prevention**
- ✓ **Corrosion Protection**
- ✓ **Leak Detection Systems**

Next:
Notification

Notification Requirements

- **Within 30 days** of bringing an UST into use, you must submit a notification form to the Division.
- The following changes in status must be reported to the Division **within 30 days**:
 - Change of ownership;
 - Change of Owner or Operator address;
 - Replacement of tank or piping;
 - Change in service (closure or temporary closure)

Notification Form

- ☐ The Notification Form is available on the Division website:

www.state.tn.us/environment/ust/forms/ust2.pdf

- ☐ A notification form can be picked up at:

Division of Underground Storage Tanks

4th Floor L & C Tower

401 Church Street

Nashville, Tennessee 37243



We Have Covered...

- ✓ **Tank Types**
- ✓ **Piping Types**
- ✓ **Spill Prevention**
- ✓ **Overfill Prevention**
- ✓ **Corrosion Protection**
- ✓ **Leak Detection Systems**
- ✓ **Notification**

Next:

Repairs, TOS, Suspected Releases



Requirements For Repairs

- Repairs to UST systems must be made to prevent releases for the life of the UST system.
- Repairs to **fiberglass tanks** may be made by the manufacturer's representative or according to manufacturer's specifications.
- Metal piping sections and fittings that have leaked **must be replaced.**
- Fiberglass pipe and fittings **may be repaired** according to manufacturer's specifications.

Requirements For Repairs

Repaired tanks and piping must:

- Be tightness tested within 30 days of the repair, **or**
- The repaired portion is monitored monthly for releases, **or**
- Be internally inspected (tanks only).

Cathodically protected UST systems that are repaired must have a cathodic protection test performed within six months of the repair.

Records of all repairs must be kept for the remaining operating life of the UST system.

Temporarily Out of Service

If you put a tank **Temporarily Out of Service** you must do the following:

1. File an amended Notification Form **within 30 days** reporting a change in service.
2. **Corrosion Protection Systems** must remain *operational* and continue to be *monitored*.
3. **Vent lines** must remain open.
4. If the Temporary Out of Service period is longer than **3 months**, all other lines, pumps, manways, and ancillary equipment must be closed by capping and securing them.

Temporarily Out of Service (continued)

If you put a tank **Temporarily Out of Service** you *should*:

5. Empty the tank to no more than **one inch** of residue.*

A **new or upgraded tank** may remain TOS **indefinitely** as long as CP and leak detection (if necessary) are maintained.

Treat any releases from a temporarily closed system just as you would from a system that is currently in use.

***If the UST is NOT empty, it must continue to meet the leak detection requirements for both tank and piping.**

Handling Suspected Releases

- Employees must know what to do when leak detection methods indicate a suspected or confirmed release. Facility personnel should be prepared to respond to releases before they occur.
Very important - the tank owner **must** report, respond to, and investigate **all suspected or confirmed releases**.
- Any **spill** or **overfill** **over 25 gallons** must be reported.
- A spill of any size must be reported if it cannot be cleaned up within **24 hours**.
- A **suspected or confirmed release** **must** be reported to the Division **within 72 hours** of its discovery. This includes monitoring results, unusual operating conditions, i.e. sudden loss of product, water in the tank, and presence of petroleum on or near the facility.

What Should You Do If You Have a Release?

- **Stop the release as soon as possible**
- **Contain the release**
- **Call your supervisor or manager**
- **Call local emergency responders**
- **Call state UST Program**
- **Keep system out of service until repaired and testing completed**
- **Remember: It is in your best interest to keep leaks as small as possible**

We Have Covered...

- ✓ **Tank Types**
- ✓ **Piping Types**
- ✓ **Spill Prevention**
- ✓ **Overfill Prevention**
- ✓ **Corrosion Protection**
- ✓ **Leak Detection Systems**
- ✓ **Notification**
- ✓ **Repairs, TOS, Suspected Releases**

Next:

Record Keeping and Financial Responsibility



Record Keeping Requirements

You must keep the following records:

- 1. Leak Detection Records**
- 2. Cathodic Protection Records**
- 3. Repair Records**
- 4. Closure Records**



Leak Detection Record Keeping

Keep the following **Leak Detection** Records:

- The results of any leak detection sampling, testing, or monthly monitoring for at least **1 year**.

Have the last 12 consecutive monthly records available for review at all times. VERY IMPORTANT

- Records of all **leak detection system** maintenance, service, or repairs **1 year** from date of repair.
- All written *performance claims* about the leak detection system **and** any *schedules of required calibration and maintenance* **5 years** from the date of installation.

Leak Detection Record Keeping

Keep the following Leak Detection Records:

- Line Leak Detector test results must be kept for at least 1 year. (Must be tested annually)
- Line tightness test results must be kept for at least 1 year. (Must be tested annually)
- Suction piping tightness test results must be kept for at least 3 years. (Must be tested every 3 years)
testing NOT required for safe suction piping

Cathodic Protection Record Keeping

Keep the following **Cathodic Protection** Records:

- The last **two** cathodic protection **tests**.

(these are done **every 3 years** by a cathodic protection tester)

- The last **three** **rectifier inspection checks** when impressed current is used.

(these are done **every 60 days** by the tank owner)




Repair Record Keeping

Keep the following Repair Records:

- Keep all ***tank and piping repair records*** for **the life of the UST system.**
- Keep records of tank lining or tank upgrading for **the life of the UST system.**

Closure Record Keeping

Records that demonstrate compliance with **closure** requirements and results of closure assessment must be maintained for **3 years** after completion by:

-  the former owner who closed the UST system, **or**
-  the current owner of the location, **or**
-  mailing these records to the Division.

Financial Responsibility

4 Elements of Financial Responsibility:

- **Mechanisms**
 - There are 8 mechanisms that may be used.
- **Amount**
 - This is how much you must be responsible for.
- **Scope**
 - Includes Corrective Action for releases and Third Party Liability.
- **Certification**
 - This is how you meet these requirements for your location(s)

Financial Responsibility

F R Mechanisms

- **State Fund**
- **Insurance**
- **Guarantee from Corporate Parent**
- **Surety Bond**
- **Letter of Credit**
- **Self-Insurance**
- **Standby Trust Fund**
- **Combination of Above**

Financial Responsibility

Amount

- **Marketers**
 - **\$1 M** per occurrence / \$1M aggregate (\$2 M aggregate >100 tanks)
- **Non-Marketers (<10,000 gal monthly throughput)**
 - **\$500 K** per occurrence/ \$1 million aggregate
(\$2 M aggregate >100 tanks)
- **Non-Marketers (>10,000 gal monthly throughput)**
 - **\$1 M** per occurrence/ \$1 million aggregate
(\$2 M aggregate >100 tanks)

Financial Responsibility

Scope

- 1. Must cover cost of cleaning up contamination, and**
- 2. Compensating third parties for bodily injury and/or property damage**

Financial Responsibility

Certification

- 1. Owner must certify and keep with facility records as long as facility is in operation.**
- 2. Only needs to be changed if mechanisms change.**

State and Federally-owned facilities do not have to show Financial Responsibility, local government-owned facilities do.

Financial Responsibility

Model Certification

[Owner or operator] hereby certifies that it is in compliance with the requirements of TCA 68-215-101, Chapter 1200-01-15.08

The financial assurance mechanism(s) used to demonstrate financial responsibility under TCA 68-215-101, Chapter 1200-01-15.08 Chapter 1200-01-15.08 is (are) as follows:

[For each mechanism, list the type of mechanism, name of issuer, mechanism number (if applicable), amount of coverage, effective period of coverage and whether the mechanism covers "taking corrective action" and/or "compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "non-sudden accidental releases" or "accidental releases."]

[Signature of owner or operator]

[Title]

[Printed name of owner or operator]

[Date]

[Signature of witness or notary]

[Date]

[Printed name of witness or notary]



New Fund Deductible

- **New UST Deductible effective July 1, 2005**
- **Entry level to the fund is \$20,000 per occurrence**

This means that tank owners must pay the first \$20,000 of expenses related to cleaning up released petroleum and the first \$20,000 for damages caused to a third party before assistance can be received from the state fund.

- **Incentive credit for higher technology can lower deductible by as much as \$10,000.**

Financial Responsibility Comparison

Marketer

11 tanks at 3 locations

*Must have \$1 M / \$2 M
aggregate*

Chooses:

State Fund + Insurance

Non-Marketer

5 tanks at 5 locations

*Must have \$500 K / \$1 M
aggregate*

Chooses:

State Fund + Self-Insure

Financial Responsibility Comparison

Marketer

11 tanks at 3 locations
*Must have \$1 M / \$2 M
aggregate*

State Fund + Insurance

\$ 20,000 Insurance
+\$ 980,000 State Fund
\$1,000,000 FR*

*if site is fund eligible and release is
fund covered

Non-Marketer

5 tanks at 5 locations
*Must have \$500 K / \$1 M
aggregate*

State Fund + Self-Insure

\$ 20,000 Self Insure
+\$ 980,000 State Fund
\$1,000,000 FR*

*if site is fund eligible and release is fund
covered

What Is Fund Coverage?

- Fund **coverage** is different from Fund **eligibility**
- Fund eligibility means *an owner* has met the conditions necessary for *a facility* to receive assistance from the Fund if a release occurs.
- A *release* can be Fund covered only if the tank owner can document compliance with certain requirements.
- It is possible for a facility to be Fund eligible and a release not be covered by the Fund.
- To receive assistance from the Fund, a facility must be Fund eligible **and** the release must be Fund covered.

Contact Information

Tennessee Division of Underground Storage Tanks

4th Floor, L&C Tower

401 Church Street

Nashville, TN 37243

(615) 532-0945

www.tdec.org/ust

Call 1-888 891-TDEC

for the Field Office Nearest You

